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Addressing the food crisis: governance, market functioning, and investment in public goods

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Abstract The 2007–08 food price crisis has not only increased food insecurity around the globe, but also exposed long-term failures in the functioning of the world food system. Establishing a global governance architecture for governing food, nutrition, and agriculture as well as improving market functioning and increasing investment in public goods will be critical for the way forward. Three high-priority policy actions are necessary to cope with urgent needs for food and nutrition security and at the same time build a stronger food system that can respond to future challenges: (1) improve productivity and scale up research investments; (2) expand nutrition and social protection, (3) strengthen markets and trade.

Keywords Food security · Food governance · Agricultural science policy

Introduction

Food is essential for people to live sustainable and healthy lives. Advances in food production, processing, and trade have substantially strengthened food availability, stability, access, and utilization in past decades. Yet, at the beginning of the twenty-first century, achieving food security for all is a far-reaching goal. The world has made only slow progress in reducing hunger in past decades, with dramatic differences among countries and regions. The number of undernourished people in developing countries actually increased from 823 million in 1990 to 923 million in 2007 (FAO 2008a). The strong, and often interrelated, forces of change that are now rapidly transforming the world food system raise additional concerns about the future state of food security. Population and income growth—combined with high energy prices, biofuels, science and technology breakthroughs, climate change, globalization, and urbanization—are causing drastic changes in food consumption, production, and markets.

The current global architecture for governing food, nutrition, and agriculture has not been able to adequately address the existing and arising challenges the system now faces. Symptoms of its disarray include incoherent or inadequate responses to large food-price changes, a slowdown in agricultural productivity growth, high energy prices and harmful biofuel policies, looming water problems, adverse impacts of climate change on agriculture, and agriculture-related health risks such as avian influenza (von Braun and Islam 2008). In addition, investment in public goods such as agricultural research and development, rural infrastructure, rural institutions, and information and monitoring has been insufficient for effective work at the frontiers of development and science.

Concerns about food and nutrition security, inflation, and social and political stability during times of rising food prices have again caused agriculture to be placed high on the global action agenda. Policymakers, development practitioners, donors, and private-sector actors should use this opportunity to increase the ability of the system to respond to emergencies and build up its resilience with appropriate policy formulation, implementation, and adequate resource mobilization. Establishing a global governance architecture for governing food, nutrition, and agriculture as well as improving market functioning and increasing investment in public goods will be critical for increasing food security.

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Short- and long-term challenges to food security in the twenty-first century

The surge in food prices from 2006 to 2008 has exposed problems in the world food system, including widespread malnutrition, declining agricultural productivity, and natural resource scarcity. These challenges have both acute short-term implications, and also pose serious threats to the long-term resilience of the world food system.

Hunger and poverty

Global progress in combating malnutrition has been slow in past decades. The 2008 Global Hunger Index (GHI)[1] score fell to 15.2 compared to 18.7 in 1990 (von Grebmer et al. 2008), indicating a slight improvement in the overall hunger situation. Yet, the number of undernourished people in developing countries actually increased from 823 million in 1990 to 923 million in 2007 (FAO 2008a). Even before the food crisis hit the poor, roughly 160 million people were living in ultra poverty, on less than 50 cents a day (Ahmed et al. 2007). In a worrying trend, the most severe deprivation is increasingly concentrated in Sub-Saharan Africa, which has experienced a significant increase in the number of the ultra poor since 1990 and is currently home to three-quarters of the world's ultra poor (Ahmed et al. 2007).

Because poor people in low-income countries already spend 50 to 70% of their budgets on food, rapidly rising food prices mean that they are even less able to afford adequate diets and, consequently, are at increased risk of food deficiency and malnutrition. Holding income constant, a 50% increase in the price of food in Bangladesh leads to a 30% decrease in iron intake. As a result, the prevalence of iron deficiency among women and children increases by 25% (Bouis 2008). Since children's nutrition is crucial for their physical and cognitive development and for their productivity and earnings as adults, the health and economic consequences of insufficient food and poor diets are lifelong—for the individuals as well as for society. A 2008 Lancet article shows that men who benefited from a randomized nutrition intervention when they were young earned wages that were 50% higher than those of nonparticipants (Hoddinott et al. 2008). Thus, even when a multi-year price shock ends, the adverse consequences for the poor continue.

To offset these shocks, social protection interventions that focus on child nutrition, women, and the poorest play an important role. Appropriate measures include both protective actions to mitigate short-term risks and preventative actions to preclude long-term negative consequences. Protective programs such as conditional cash transfer programs, pension systems, and employment programs exist in many low-income countries and should be scaled up. Where such interventions do not exist, targeted cash transfer programs should be introduced in the short term. If food markets function poorly or are absent, however, providing food can be a better option than providing cash. Preventative health and nutrition programs targeted to vulnerable population groups (such as mothers, young children, and people living with HIV/AIDS) should be strengthened and scaled up to ensure universal coverage. This is essential to prevent the long-term consequences of malnutrition on lifelong health and economic productivity. In addition, school feeding programs can play an important role in increasing school enrollment, retaining children in school, and enhancing their learning achievements.

High energy prices and biofuels

The expansion of biofuel production has indisputably created new linkages, trade-offs, and competition between the agricultural and energy sectors. It has also introduced new food-security risks and new challenges for the poor, particularly when natural-resource constraints have led to trade-offs between food and biofuel production and also to rising food prices. Indeed, rising demand of biofuel feedstocks has introduced a fundamental change in world food price determination. The conventional link between energy and agricultural prices has always been via the prices of agricultural inputs—that is, the prices of fertilizer, pesticides, irrigation, and transport. Now, energy prices also strongly affect agricultural output prices through opportunity costs. The amount of grains diverted to ethanol production tripled from 2004 to 2008 (International Grains Council 2008). IFPRI research shows that increased biofuel demand contributed to 30% of the weighted average increase of world grain prices from 2000 to 2007 (Rosegrant 2008). Further, as the correlation between energy and agriculture prices increases, volatile energy prices have translated into larger food-price fluctuations, to which poor people have little capacity to adjust.

Biofuels promotion and subsidy policies need to take food-security consequences into account. When food prices are high, such subsidies for biofuel production should be frozen, reduced, or subjected to a moratorium on biofuels from grains and oilseeds until prices subside. Developed country governments should cease their support for uncompetitive biofuel productions with subsidy regimes, which implicitly act as a tax on basic food and distort the competitive advantage of developing countries. Though developed and developing countries have established ambitious biofuel expansion plans and blending targets,

[1] The GHI is a combined measure of three equally weighted components: (1) the proportion of undernourished as a percentage of the population, (2) the prevalence of underweight in children under the age of five, and (3) the under-five mortality rate. The 2008 GHI is based on data until 2006—the last year with data available at the time of publication.

biofuel production still remains uncompetitive in many places of the world. Second-generation biofuel technologies are in the making. If they are "smart," these technologies may partly overcome the food–fuel competition and lessen the negative effects on the poor, for example if they use joint-product technology such as sweet sorghum or enhance biomass and other feed stocks for biofuels on marginal lands.

Declining productivity and limited natural resource base

Underinvestment in public goods—such as agricultural research, science, and technology, rural infrastructure, and information and monitoring—has impaired agricultural productivity and production growth in recent years. Indeed, yields and overall agricultural productivity have stagnated. Annual world yield growth has declined from about 3% in the 1960s and 1970s to less than 1% since 2000 (FAO 2008b). Growth in total factor productivity (derived from the ratio of total output growth to total input growth) exhibits large variation among regions. From 1992 to 2003, East Asia and Latin America experienced rapid growth at 2.7% per year, while total factor productivity in other regions grew at only 1 to 1.6% (von Braun et al. 2008). In the future, as climate change further increases climate vulnerability, temperature, and the risk of droughts and floods, threats to agricultural productivity and production will increase. By 2080, agricultural output in developing countries may decline by 20% due to climate change (Cline 2007) and yields in developing countries could further decrease by 15% on average (Fischer et al. 2005).

At a time when productivity is slowing down, demand for agricultural commodities has been surging because of population growth, biofuel production, income growth, globalization, and urbanization. Between 2000 and 2007, cereal demand consistently exceeded cereal production, and cereal stocks have consequently declined. Rising expectations, speculation, and hoarding have also led to increased food prices and volatility. Growing demand for agricultural products also increases competition for natural resources, forests, and water systems. Increased competition for land, for example, has led to rising farmland prices throughout the world. In 2007, farmland prices increased by 16% in Brazil, by 31% in Poland, and by 15% in the Midwestern United States.

In many countries, developed water sources are almost fully utilized, and new sources are becoming increasingly expensive to develop. Food security in the twenty-first century will greatly depend on suitable water policies, especially under climate change conditions. Currently, 1.1 billion people do not have access to safe water, and arid and semi-arid regions are experiencing persistent water shortages. In the future, growth in water demand for agriculture is expected to drastically increase. The International Water Management Institute (IWMI) points out that at minimum, an additional 2,000 to 3,000 km^3 of water will need to be found for irrigated and rain-fed cropping by 2030, which represents about 33% of what is currently used. It takes 1 l of water to grow 1 cal of food. As the world increasingly moves to western-style diets, an average person will each day "consume" 2500–3000 liters of water that has been used to produce the food he or she eats. National governments, development partners, and water users can address the current and emerging water crisis by pursuing three broad strategies: (1) increasing the supply of water for farmers, households, and industries by investing in infrastructure; (2) conserving and re-using water and making existing systems more efficient by reforming pricing policies, and investing in improved technology in these systems; and (3) increasing crop productivity per unit of water and land by improving water management and directing research and policy efforts toward rain-fed agriculture.

Architecture of national and global food

Ensuring food security today not only requires appropriate agricultural management and utilization of natural resources and eco-systems, but also good governance and sustainable political systems. It has long been recognized that social conflict increases food insecurity, but it should also be pointed out that food insecurity can be a key source of conflict. Energy-security objectives that have led to subsidized expansion of biofuel production also contribute to food insecurity. The energy-security gain brought about by biofuel production may be largely overwhelmed by broader losses in political security emerging from frustration due to higher food prices. Thus, food security, energy security, and political security, and their associated risks are linked (Fig. 1), and bring about important trade-offs.

Recent evidence shows that people do not passively respond to food-price increases, but also increasingly turn to street protests. The poorest usually suffer silently for a while, but the middle class typically has the ability to organize, protest, and lobby early on. Since early 2007, increasing food costs and general living costs have led to social and political unrests in about 60 countries, with some

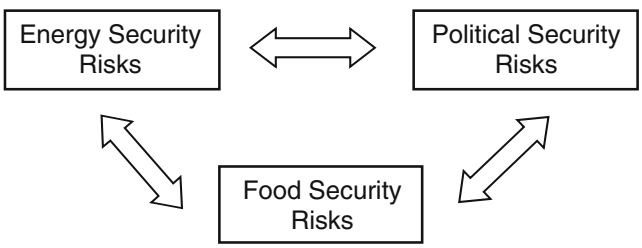

Fig. 1 Linkages between food security, energy security, and political security. Source: Devised by author

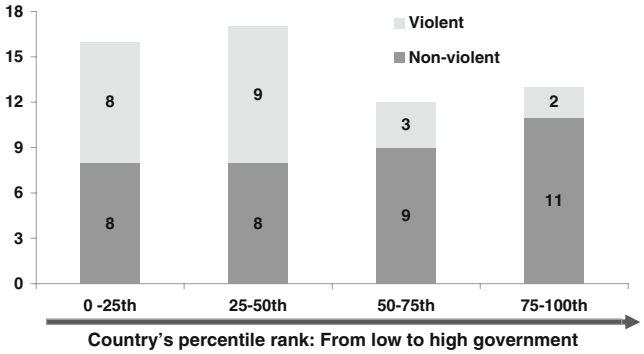

Fig. 2 Food protests in 58 countries by type and government effectiveness (2007–08)

experiencing multiple occurrences and a high degree of violence. While this unrest has occurred in countries with low performance in governance, other countries have also been affected (Fig. 2).

At the international level, a new agriculture, food, and nutrition governance architecture is needed to provide the leadership and direction required to ensure food security for all in the twenty-first century. The food-related global public goods that must be addressed by an effective governance architecture include: (1) global food emergency responses, (2) trade and standards, (3) competition policy (4) international agricultural research, (5) food safety and agriculture-health links, (6) climate change adaptation and mitigation, (7) cross-boundary water, and (8) natural resources, for instance, soils and genetic resources. Some institutions, conventions, declarations, and organizations already exist for most of these functions, but there is ample room for scaling them up, efficiently coordinating them, or increasing their effectiveness. The roles and structures of the global organizations addressing food, agriculture, and related health issues—the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), the World Health Organization (WHO), the World Bank, the World Trade Organization (WTO), and the Consultative Group on International Agricultural Research (CGIAR)—have evolved during the past six decades. Individually, they all serve important functions, but collectively they may now require rethinking and adjustment to meet new and emerging challenges in a comprehensive fashion in the coming decades.

The broad outlines of options for change in global governance and coordination of the agricultural system include three potentially complementary options for change. The first option is to (1) *improve existing institutions and create an umbrella structure for food and agriculture*. This option could involve, for example, strengthening the United Nations and CGIAR systems for agriculture, food, and nutrition in terms of their effectiveness, their governance, and their resources, as they are clearly underfunded. The second option is to (2) *form an innovative government network*—that is, to strengthen government-to-government systems for decision making in the areas of agriculture, food, and nutrition through a set of agreements and conventions. Steps are already being taken for more structured networks between institutions within governments in areas such as public health, but not as much in agriculture, food, and nutrition. A third option is to (3) *expand the current system to explicitly engage the new players in the global food system—the private sector and civil society, including large private foundations—together with national governments in new or significantly reorganized international organizations and agreements*. Given that the global food system is in reality no longer governed only by governments, this inclusive approach seems worthwhile now.

Market and trade policy

Overall, the world has become increasingly prosperous and well-fed in the past three decades as national markets have become more open and globalization has accelerated. At the same time, the distribution of assets and income has become more unequal as international corporations have been increasing their power and leverage compared to other actors (von Braun and Diaz-Bonilla 2008). Contrary to perceptions of across-the-board increases in world integration, the globalization of the agrifood system—in other words, the integration of the production and processing of agriculture and food items across national borders through markets, standardizations, regulations, and technologies—has been uneven. In some regions, there has not been enough cross-border and national integration, and access to markets is limited.

The extent and pace of international integration as well as the functioning of markets is impaired by uncoordinated government responses to the food price crisis, which have led to enormous efficiency losses within the global food system, have hit the poorest countries and people the hardest. When food prices were particularly high, major producers have imposed export restrictions on agricultural commodities in order to minimize the effects of higher global prices on domestic prices and to mitigate the impacts on particular groups. These export restrictions may reduce food shortage risks in the short term, but they add up to trade policy failures, make the global market smaller and more volatile, and have adverse impacts on import-dependent partners. Many countries were also imposing retail price controls, which create perverse incentives for producers. International aid agencies have had difficulties accessing grain for humanitarian operations, while some donors have defaulted on food aid contracts.

Mostly as a symptom of the crisis, the flow of speculative capital from financial investors into agricultural commodity markets has increased drastically. In the first half of 2008, the traded volumes of grain and oilseed options increased by 32% compared to the same period in 2007 (Chicago Board of Trade 2008). The gap between cash and future prices has risen and stimulated overregulation, causing some commodity exchanges in Africa and Asia to halt futures trading. Distrust in markets and a re-examination of the "merits" of self-sufficiency have led many countries to rebuild their national stocks and invest in agriculture in other countries to secure supplies. Feeling the pressure of insufficient natural resources, some Asian and many Gulf countries are purchasing land and investing in agricultural production in other countries, mostly in Sub-Saharan Africa and Central Asia.

To cope with the existing market failures at grain markets, a two-prong new global institutional arrangement is needed: (1) a minimum physical grain reserve for humanitarian assistance should be established, and (2) a virtual reserve and intervention mechanism, backed up by a financial fund, must be created to calm markets under speculative situations, such as in 2008 (von Braun and Torero 2008). A modest grain reserve, to be used exclusively for emergency responses and humanitarian assistance, could be supplied by the main grain-producing countries, funded by the G8+5, and managed by the World Food Programme. A virtual reserve and intervention mechanism would be based on a coordinated commitment by participating countries. Each of the countries would commit to supplying funds if needed for intervention in the grain futures markets. A high-level technical commission appointed by the participating countries on a permanent basis, would depend on a "global intelligence unit" to trigger the alarm that prices are deviating significantly from their estimated dynamic price band (that is, lower and upper price limits) based on market fundamentals, and that intervention is needed. Usually, intervention would not be necessary and the whole operation would remain promissory or virtual. In addition, action and innovations are needed for better connecting millions of small farmers to markets and especially to the new processing and retail value chains (such as contract farming arrangements and cell phone-based market information).

Agricultural science policy

Science has made a tremendous contribution to the quality and quantity of food in the twentieth century, and spending on agricultural R&D is among the most effective types of investment for promoting growth and reducing poverty. Science and technology will have an increasingly important role to play in mitigating the negative effects of the forces of change on the world food system and their impacts on the poorest and hungry people. Yet, agricultural science spending has been stagnating since the mid-1990s and the gap between rich and poor nations in generating new technology remains (Pardey, Alston, and Piggott 2006). For every US $100 of agricultural output, developed countries spend US $2.36 on public agricultural R&D, whereas developing countries spend only US$0.53. From 1992 to 2006, funding for the CGIAR, which is a major contributor to agricultural innovation in partnership with national research systems, increased from US$337 million to US$445 million, representing an annual growth of only 2%. These resources, however, are hardly enough to work at the frontiers of new science such as nanotechnology and biotechnology.

A broad-based consensus is growing that investment in agriculture and in related, research-based innovations must be accelerated. If investments in public agricultural research increased from about US$4.6 billion to US$9.3 billion (including an increase in CGIAR investment from US$0.5 to US$1.0 billion), the results would be increased agricultural output and fewer people living in poverty. The exact numbers would depend on how investments were allocated (von Braun et al. 2008). If the goal is to maximize total agricultural output, which would reduce global price increases, this would require allocating more resources to East and Southeast Asia. This would raise output growth from 0.5 to 1.5 percentage points a year and would reduce the number of people living on less than US$1 a day by 204 million by 2020. If, on the other hand, the goal is to minimize poverty, relatively more resources would need to be spent on Sub-Saharan Africa and South Asia. Overall agricultural growth would increase from 0.5 to 1.1 percentage points a year and lift about 282 million people out of poverty by 2020.

Not all agricultural research investments are equally worthwhile. Which specific investments would produce the greatest sustainable poverty reduction? A survey of CGIAR and other scientists and research leaders has produced a list of "best bets" for CGIAR investments in coming decades. This list is not a comprehensive one, but rather a representative one, showing key examples of promising investments in line with the CGIAR's strategic objectives and their likely impact on enhancing technology innovation, improving natural resources management, and improving institutional innovations and policies. Examples of "best bets" for CGIAR investments in the coming decades include breeding high-yielding wheat cultivars that are resistant to newly threatening pests, engaging in climate-change and adaptation research to increase the resilience of agro-ecosystems, promoting the biofortication of crops to improve the micronutrient consumption of the poor, and combining organic and inorganic nutrients for increased crop productivity. All of these investments have substantial payoffs for a large number of beneficiaries (see Table 1).

Table 1 Indicative "best bets" for international agricultural research

	Goal	Approach	Cost (Mil. US$)	Beneficiaries
1	*Increasing the productivity of crop and livestock systems*	Revitalizing yield growth in the intensive cereal systems of Asia	150	More than 3 billion people
2		Ensuring productive and resilient small-scale fisheries	73.5	32 million people
3	Reducing vulnerability to biotic	Controlling wheat rust	37.5	2.9 billion people
4	and abiotic stresses	Developing a vaccine for East Coast Fever in cattle	10.5	32 million people
5		Developing drought-tolerant maize for Africa	100	320 million people
6	*Improving the nutritional quality of food*	Scaling up biofortification	125	672 million people
7	*Addressing Climate Change*	Increasing carbon sequestration and improving the livelihoods of forest people	45	48 million people
8	*Increasing the resilience of agro-ecosystems*	Conducting climate change and adaptation research	127.5	1.2 billion people
9	*Improving soil fertility*	Combining organic and inorganic nutrients for increased crop productivity	55	400 million people
10	*Increasing the efficiency of water use*	Promoting sustainable groundwater use	24	261 million people
11	*Improving genetic resource management*	Enhancing germplasm exchange	15	Global impact
12	*Undertaking institutional innovation to improve market access*	Improving market information and value chains	10.5	45 million people
13	*Ensuring that agricultural production benefits the poor, especially women*	Including women in extension and innovation	30	200 million people
14	*Promoting agriculture-health linkages*	Exploiting agriculture-health links to benefit the poor	75	Global impact

Source: von Braun et al. 2008

Priorities for action

The 2007–08 food price crisis is not only a short-term emergency for millions of people, but also longer-term failure in the functioning of the world food system. Priorities for action at the national and global level must address the immediate food needs of poor people priced out of food markets, and at the same time correct previous failures in agricultural policy by investing in agriculture and food production, setting up reliable systems for assisting the most vulnerable people in a timely way, and establishing a fair global trading system and a conducive investment environment. Three high-priority policy actions are necessary to cope with urgent needs for food and nutrition security and at the same time build a stronger food system that can respond to future challenges:

1. Productivity and Research: undertake fast-impact food production programs in key areas and scale up investments for sustained agricultural productivity, including agricultural science policy and appropriate finance;
2. Nutrition and Social Protection: expand emergency responses and humanitarian assistance to food-insecure people and invest in social protection for nutritional improvement;
3. Markets and Trade: eliminate agricultural trade restrictions and facilitate rule-based and fair global and regional trade openness; change biofuel policies; undertake market-oriented regulation of speculation; implement innovative virtual grain reserve policies.

The design of specific national strategies must be country-driven and country-owned, with specific prioritization and sequencing. Yet, part of the difficulty of developing country policymakers in responding to the food crisis, and shocks to the world food system in general, is the lack of credible and up-to-date data on the impacts of food and nutrition insecurity and the effects of policy responses (Benson et al. 2008). Such information would allow international and national decision makers to use feedback to adjust their responses and achieve maximum effectiveness. Much more investment and sound coordination is needed in this area. In addition, policy actions should be combined with investments in implementation capacity to utilize potential opportunities for agriculture. Prioritization, sequencing, transparency, and accountability will also be crucial for successful implementation. This means that policy and governance practices in many developing countries must be strengthened.

Investment in the proposed actions will have large humanitarian, economic, political, and security benefits, but it will also require additional international resources and reallocation of resources at the national level. The global incremental public investment required to overcome the food crisis, and still meet the first Millennium Development Goal of halving poverty and hunger by 2015, is at least US$14 billion per annum. For Sub-Saharan Africa, the annual incremental investment is estimated to be about US$5 billion, if countries fulfill their Comprehensive Africa Agriculture Development Program (CAADP) agenda commitment to invest 10% of budgets in agriculture (Fan and Rosegrant 2008).

To substantially improve food security in the twenty-first century, changes need to be made now. The strategic way forward must be facilitated by international cooperation and guided by a strong global governance architecture of agriculture, food, and nutrition.

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